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PERSISTENT DIARRHOEA IN MOZAMBICAN CHILDREN

-A study of risk factors for development of persistent diarrhoea in children aged 6 to 23 months, in Magude district- Mozambique.

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The monograph is dedicated to my mother, and all mothers
whose gentle love, guide children
in this world.

Contents

Abstract

Persistent diarrhoea in Mozambican children - a study of risk factors for development of persistent diarrhoea in children aged 6 to 23 months, in Magude district- Mozambique.

Background. The investigation aims to explore the factors giving rise to the development of persistent diarrhoea (PD) and to find out the prevalence of persistent diarrhoea and *Giardia lamblia* in children aged 6 to 23 months. The main reasons for carrying out the study were: (i) Lack of knowledge about PD in Mozambique. (ii) Infant mortality rate in Mozambique has changed little in the last 20 years. (iii) Diarrhoea is the second cause of morbidity and mortality among children in Mozambique. (iv) An active national programme on health education concentrated on the treatment of acute diarrhoea, while less effort was put into information about PD.

Methods. A "*case-control study*" was carried out. 100 children who had diarrhoea for two weeks or more (PD) were compared firstly with 100 children without diarrhoea (WD) and secondly with 100 children with acute diarrhoea (AD), described as symptoms for more than two days but less than two weeks. Laboratory examinations and focus group discussions were also carried out.

Results. In general, PD was associated with low nutritional status ($p<0,005$). The association was more pronounced for parameters of chronic malnutrition (HAZ) than it was for mild (WAZ) or acute malnutrition (WHZ). PD was also significantly associated ($p<0,05$), with low migration of the mothers (OD=0,46); high use of protected drinking water (OD=3,59), treated water (OD=2,35), and use of medicines (OD=0,24); with high number of children who had diseases (OD=3,82) and with children who had diarrhoea in the 2 months prior to the data collection (OD=3,63)). Prevalence of PD in Magude village was 4,65% and of *Giardia lamblia* infection was 5,3%.

Discussion. In general the risk factors for development of persistent diarrhoea were the same as those described in studies carried out in other African countries. Poor nutritional status was a risk factor for developing PD and was more pronounced between stunted children than underweight or wasted children. It may be an indication that the deterioration in nutritional status had started before the present episode of PD. This finding underlines the crucial role-played by

nutrition for development of PD. The diet given to the child during episode of diarrhoea was a significant risk factor, which also underlines the interplay between nutrition and PD. A history of having migrated out of the district during the civil war was negatively associated with PD. A probable explanation for this is that the families were living where life conditions were better and the health services were more accessible. Access to protected and treated water was positively associated factors to PD. This is surprising but it is likely that people were too trusting of water supply, which could explain the consequent diarrhoea between vulnerable populations. Use of medicines was negatively associated to PD because the drugs have been used to treat very ill children as was mentioned in focus group discussions. Health history of the child was a risk factor, which was described in other studies. A lack of knowledge in the community about PD was found during focus group discussions. It is suggested that there should be a focus on nutrition and chronic diseases in health education programs. Further work is proposed in order to determine the real influence of water on PD in this area. The low prevalence of PD (4,65%) is approximately the same as the 5% find by Ketema (1997). The presence of *Giardia lamblia* (5.3%) was not associated with PD in this setting.

Key words. Diarrhoea, associated factors, prevalence, nutritional status, Mozambique

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Abbreviations

AD	Acute Diarrhoea
AIDS	Acquired Immunodeficiency Syndrome
AIM	Agencia de Informacao de Mocambique
DDO	Dialogue on Diarrhoea Online
FGD	Focus Group Discussions
GDP	Gross Domestic Product
HA	Height-age
HIV	Human Immunodeficiency Virus
HC	Health Center
IMCI	Integrated Management of Childhood Illness
NGO	Non-governmental Organizations
OMM	Women's organization of Mozambique
ORS	Oral Rehidratation Solution
PA	Post Administrative
PD	Persistent Diarrhoea
RHC	Road Health Card
UNHCR	United Nations High Commissioner for refuge
UNDP	United Nations Development Programme
WA	Weight-age
WD	Without Diarrhea
WH	Weight-height
WHO	World Health Organization
Z	Z score

Definitions

Acute diarrhoea A child with more than three liquid or semi-liquid stools per day for two days or more but less than two weeks.

Diet Ones habitual food in terms of milk, vegetables (non-roots=leaves roots=potatoes, yam, cassava, etc.), meat, fish, eggs and cereals.

Health history Any kind of disease in the 2 months prior to the survey (diarrhoea, coughs, Malaria and others).

Hygiene Principles and practices of maintaining health. It was accessed in terms of water for drink (protected=covered storage and treated), presence of latrine and wash hands after using toilet or changing nappies.

Medication Traditional and/or conventional substance used in curative treatment of diarrhoea (liquids and others).

Migration Mother who move from Magude to live in another place and move back to Magude after some time.

Nutritional status Physical condition of the child, according to weight for age (wa), length for age (ha) and weight for length (wh) z scores from WHO.

Persistent diarrhoea Child with more than three liquid or semi-liquid stools per day, in a period of two weeks and more.

Without diarrhoea Child without more than three liquid or semi-liquids stools per day.

I. Introduction

This chapter contains: the literature review, justification of the study, research hypothesis and question, objectives and limitations for the present study.

1. Literature review

1.1 Persistent diarrhoea

1.1.1 Epidemiology

According to World Health Organisation (WHO), a proportion of acute cases of diarrhoea in developing countries (about one in ten), becomes *persistent* (DDOnline,1992). Cases lasting more than two weeks are responsible for 35 percent (%) of deaths by diarrhoea. Standard management can prevent 80% of deaths caused by diarrhoea (WHO, 1998).
Persistent diarrhoea prevalence is ranging from 5% to 16,5 % according to studies performed in hospitals and in household surveys in Nigeria and Kenya (Ketema, 1997, Mbouri-Ngacha, 1995).

A healthy immune system, presumably, can fight gut infections. However previous episodes of acute diarrhoea are responsible for gut damage and for the change in children's immune defences (DDOnline, 1992). Also the severity of diarrhoea and coexisting systemic infections are key determinants of the response to nutritional therapy in children with persistent diarrhoea (Bhutta, 1997). Then the risk of persistent diarrhoea is increased by impaired immunity due to malnutrition (DDOnline, 1992; Rice, 2000, Bohler, 2000). Also lower respiratory tract infection, and poor educated mothers were factors independently associated with severe persistent diarrhoea among children under five in Bangladesh (Alam, 2001).

1.1.2 Nutrition Status and Persistent diarrhoea

Malnutrition is a disease of a many children with persistent diarrhoea, which results from reduced food intake and /or loss of nutrients through diarrhoea (DDOnline, 1992; Bhan, 1996; Lima, 2000; Karim, 2001). Those with persistent diarrhoea in a hospital-based study held in Nigeria, had worse nutritional indices than those who had acute diarrhoea (Sodeind, 1997). The rapidly growing brain is very vulnerable to malnutrition. Effects on children are seen as developmental delays in all areas. Chronic malnutrition causes stunted growth and adverse effects on mobility, language development, social competence, cognitive development of intelligent thinking, problem-solving and developmental stimulation before the age of 2 years

and continuing for at least 3 years. It has been shown that delays in development can be reversed by adequate nutritional therapy (J. Elizabeth, 1994).

1.1.3 Aetiology

Persistent diarrhoea is strongly associated with HIV and opportunistic infection (Ndubani, 1998; Bhan, 1996). *Enteroaggregative E. coli* and *criptosporidium* were isolated with a significantly greater frequency in episodes of persistent diarrhoea (Bhan, 1996; Bardhan, 1997). Systemic illnesses and persistent diarrhoea as well as the importance of cryptosporidiosis as cause of persistent diarrhoea, has been confirmed in Guinea-Bissau (Sodemann, 1999).

Giardia lamblia is one of the commonest causes of chronic diarrhoea in the returned travellers. In developing countries prevalence rates of *Giardia lamblia* range from 20% to 30% (Thielman, 1998). The isolation rate of *Giardia lamblia* was very low and not associated with acute or persistent diarrhoea in Bangladesh, but other studies have showed that the prevalence rate of *Giardia lamblia* in children is higher in urban areas than in rural areas in Bangladesh (Bardhan, 1997). The prevalence rate of *Giardia lamblia* was 3,1% among children under five in Saudi Arabia (el-Sheikh, 2001).

1.1.4 Management

During persistent diarrhoea, proper choice of diet requires understanding of the digestive capacity. The food chosen should be easy to digest and absorb (to avoid osmotic effect), contain adequate nutrients, be non-allergenic, energy-rich, and acceptable to the child. It is important to take in consideration the followings factors:

(i) Complementary protein sources should be used.

(ii) Complex carbohydrates (starches) should be used to avoid hyper osmolarity and reduce the problem of lactose maldigestion - e.g. milk-cereal mixtures are preferable to milk given alone.

(iii) Fats that are most readily digestible should be chosen, especially to increase energy intake (DDOnline, 1989; WHO, 1992; Bhan, 1996; Bhatnagar, 1996; Bhutta, 1997).

The contribution of dehydration to persistent diarrhoea associated deaths is uncertain but available data indicate that it is much less important than in acute watery diarrhoea (Bhan, 1996; Alam, 2001). However, a study held in Nigeria shows that mothers still ignore oral rehydration solution (ORS), (Cuttis, 1988; Iyun, 2000). The rice-ORS contains 3,6 g protein and 152,1 kilocalories per litre of the preparation. It is acceptable and effective in oral rehydration solution of diarrhoea patients (Akosa, 2000). Rice-based reduced osmolarity ORS is clinically more

effective than WHO-ORS and may thus be advantageous for use in the treatment of children with persistent diarrhoea (Dutta, 2000; Sarker, 2001).

The use of local low cost diet is as effective as soya formulas in management of persistent diarrhoea in malnourished children (Akram, 1997). Therapeutic feeding and micronutient supplementation had an immediate and sustained beneficial effect on growth in children with persistent diarrhoea (Bhandari, 2000; Valentiner-Branth, 2001). The researchers in Guinea-Bissau were unable to identify management factors with significant influence on the risk of developing persistent diarrhoea (Sodemann, 1999).

1.1.5 Diet influence

Breast-feeding is the most important diet for children under 4 months old. Breast-feeding should be continued and encouraged in patients with persistent diarrhoea (DDOnline, 1989; Bhan, 1996; Karim, 2001).

Weaning foods, with low energy density, appear to be a major contributor to growth faltering and ultimate malnutrition in many developing countries. Evidence from doubly labeled water studies suggests that these diets are adequate when children are healthy but fail to support rapid catch-up growth after diarrhoea and other infections (Prentice, 2000; Cao, 2000). Also diarrhoea is common in children living in poor communities where family feeding habits contribute to malnutrition. (Bhan, 1996).

1.1.6 Water and medication

Use of unsafe drinking water and irrational antibiotic use were significantly associated with persistent diarrhoea in a study carried out in Bangladesh (Karim, 2001: Mahmud, 2001). Also home medication, tended to increase the risk for the development of persistent diarrhoea (Sodemann, 1999). Water from storage containers obtaining by dipping, were associated with diarrhoea (Teklemariam, 2000).

1.1.7 Socio economy

Bytzer et all (2001) in a population based study done in Australia concluded that: low socio economic status is a risk factor for gastrointestinal symptoms. However diarrhoea was not associated with social class.

1.1.8 Beliefs about diarrhoea

Sodemann (1996) described that mothers have a natural explanation (new teething, etc) about the aetiology of diarrhoea. Bentley, Zoysa and Ene-Obong (1984) distinguished two broad classes of etiological concepts: those related to a child's physical environment and those associated with a child's social or spiritual environment.

1.2 The study area

1.2.1 Country profile

1.2.1.1 Localisation

Mozambique is poor country situated in the southeast part of Africa (see annex 2). The east of Mozambique borders the Mozambique Channel; to the west is South Africa and Tanzania to the north. It has an area of 801,590 square kilometres with 2,470 kilometres of coastline. Mozambique has tropical to subtropical climate (The world fact book, 1999).

1.2.1.2 History

The country of Mozambique is 106 years old and came into existence in its present form as a result of an Anglo-Portuguese treaty of May 1891 and gained its independence from Portugal in 1975. The Mozambique created in 1891 was not a piece of random map drawing but an attempt to make sense of the history of the region in a single colonial state. In doing so, it accepted a part of the African coast, which was established in the sixteenth century when the Portuguese divided their command in eastern Africa between the states (capitanias) of Mozambique and Mombassa. Portugal claimed sovereignty or effective occupation after the Berlin congress in 1884-85.

The agreement granting Mozambique independence was signed on September 28 in Lusaka.
Frelimo came to power determined to end both social and political oppression (Montiero NT, 1992).

After independence 90% of the Portuguese colonists left the country, taking with them almost 80% of the skilled labour force, sabotaging the industrial and commercial infrastructure. This resulted in the economy, particularly the administration becoming even weaker. To address the problems a of skilled manpower shortage and abandoned infrastructures, Frelimos policy was to control the economy and social services through nationalisation and intervention involving

education, health, housing and some strategic enterprises such as banks, insurance companies, railways, and ports. In the social sector, free education and health were introduced; skill training was given priority and the creation of primary health care and education services, including adult literacy in the entire country were established. Socialism was adopted as the development model and, thus, great importance was given to social issues. (Montiero NT, 1992).

The economic and social trends during this time show that from 1977 to 1980 both economic and social indicators improved significantly. According to Bridge Walker and Garbiel L. Dava, the Gross Domestic Product (GDP) increased by 7 % from 1977 to 1980, life expectancy grew to 46 years, the illiteracy rate dropped to 73 % and there was an increase of 80% in health services. From 1980 to 1986, all these indicators decreased and the GDP was reduced to a negative growth of -0.7 %. In 1990 GDP/capita was US $ 80 caused by the war of destabilisation ((Montiero NT, 1992).

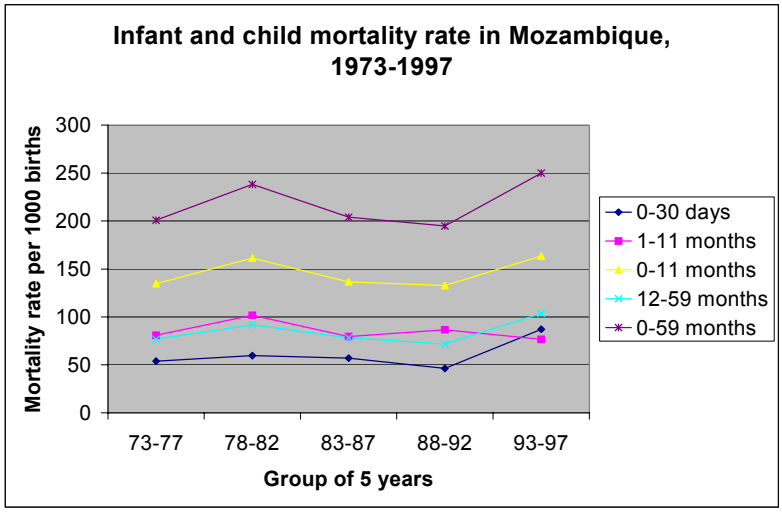
The country had a civil war after getting independence in 1975. An estimated 1.3 million persons have fled Mozambique since 1986 because of civil war. Many *refugees* were detained at border posts and temporary reception centres with inadequate shelter, sanitation and water. During the first 4 weeks after the refugees arrived in camp, daily death rates increased (ex. from 7.3 per 10,000 population to 8.2 per 10,000 population in Zimbabwe). Diarrhoea, dehydration, malnutrition and measles were the most frequent causes of deaths among refugees. Because of this efforts were accelerated to ensure that every child aged 6 months to 15 years were vaccinated against measles on arrival in a camp. There were increased resources for family latrine construction; and provided refugees in reception centres with adequate soap, water, buckets (latrines), and shelters (Centre of Disease Control, 1992). Then when the Peace agreement of Rome was achieved, the war finished in 1992, and refugees' repatriation was started.

1.2.1.3 Population and Health

According to the census of 1997 the reported population was 16,542,800 inhabitants, and the birth rate is 42.75-births/1,000 populations, and the death rate is 17.31-deaths/1,000 population (National Institute of Statistic of Mozambique, 1999).

Infant mortality rate is 133,9 deaths/1,000 live births in Mozambique which is about the same as the mortality levels at the time of independence in 1975 (figure 1). Contrary to observations in other developing countries, including sub-Saharan Africa, infant and child mortality in Mozambique has not declined significantly (National Institute of Statistic of Mozambique, 1999).

Figure: 1



*Health Demographic Survey, Mozambique 1997.

Primary causes of morbidity and mortality in Mozambique are caused by communicable disease, especially malaria, diarrhoea and respiratory infectious disease in children (Ministry of Health of Mozambique, 1999). Approximately 23 % of children fewer than 3 years of age had diarrhoea in the two weeks preceding the survey in Maputo city. The prevalence of diarrhoea increases steadily from age 2 months to15 months, when it peaks at 38 %. Then it falls to 20 % by age of 20 months and remains at that average until 3 years of age. The rapid rise in the prevalence of diarrhoea during infancy reflects the increased risk of pathogen contamination associated with early introduction of water, other liquids, and solid foods (Ministry of Health of Mozambique, 1997). Also, once infants begin to crawl and move around, they tend to put objects into their mouth, that again increase, the risk of pathogen contamination (Oni, 1996; Ministry of Health of Mozambique, 1999).

Malnutrition is an important factor causing death in many young children in Mozambique. 36% of children aged 0 to 35 months are chronically malnourished, 8% of the same children are wasted and 26% are underweight in Mozambique (Ministry of Health of Mozambique, 1997).

It is also known that the main weakness in the management of diarrhoea cases is lack of health education, especially about the required quantity of fluid intake. An example: some mothers believe that oral rehydration solution is a medicine to `stop the diarrhoea` and its administration is like syrup, one teaspoonful three times a day (Cutts, 1988).

The type of toilet used in a household reflects its wealth. Poor households are less likely to have adequate toilet facilities. Inadequate sanitation facilities result in an increased risk of diarrhoea disease, which contributes to malnutrition in Mozambique (Ministry of health of Mozambique, 1999). As in other African countries, in Manica and Nampula a survey between traditional healers found that childhood diarrhoea is usually believed to be caused by eating bad or incompatible food, breastfeeding under certain conditions (new pregnancy), teething, parents having sex with other partners, bad water, and poor hygiene. The same study has concluded that the traditional healers prescribe only small amounts of fine-grained, non-watery porridge for children with diarrhoea (Green, 1999).

HIV/AIDS is a rapidly emerging problem. While Mozambique was protected from HIV/AIDS through its isolation by war, population movement brought by peace has stimulated the growth of HIV infection, especially along the main transport and trade routes, resettlement areas and areas of migrant labour. Infection rates are currently estimated at 14.2% of the population aged 15-49, with 5.8% in Maputo and around 20% along the main transport corridors. An estimated 1.2 million people are infected; with around 250,000 cumulative AIDS deaths in adults and children. About 24,000 children contract HIV annually through prenatal transmission. If adult rates continue to rise as projected, then over 50,000 babies will be infected per year from about the year 2002 (UNICEF, 2001).

Mozambique has given priority to primary health care with a principal focus on mother and child health. At the same time women and children identified as having a high-risk status were rarely given additional care and support. The health education programme is predominantly working with the mothers of under-fives and prenatal clinics (Jelley, 1983).

1.2.2. District profile

1.2.2.1 Localisation

Magude district is located in southern Mozambique, bordering South Africa (see annex 3). The district belongs to Maputo province. It is situated approximately 150 kilometres from Maputo city (capital of Mozambique). Magude district is divided into five administrative posts: Magude the centre of the district, Mahele, Mapulanguene, Panjane, and Motaze(United Nations High Commissioner for Refugees (UNHCR), United Nations Development Programme (UNDP), 1997). This district has an area of 6,960 square kilometres and density of approximately 6 inhabitants per square kilometres (Ministry of health Mozambique, 1998).

1.2.2.2 Economic situation and available food

The Magude district is the poorest district of Maputo Province (Adamo, 1996). The region has been affected by flooding since the beginnings of February 2000. Electricity supply was the main affected source and some roads were cut during the first two months (AIM, 2000). Agriculture is the dominant activity, involving the majority of local households. The main domestic animals for household consumption are goats, pigs, chickens, rabbits and ducks. However the goats, pigs and cattle are mainly raised for sale not for household consumption. Rabbits and small antelopes are hunted for food too. Many rivers and streams cross the district; therefore fish is a significant item in the household diet (UNHCR, UNDP, 1997).

1.2.2.3 Water

Access to clean drinking water in Magude is not available to the whole population (UNHCR, UNDP, 1997). The water quality was classified inadequate for human consumption after chemical and microbiological analysis, because the water treatment station was not working. The people were advised to boil or chlorinate water at home (Annual Report of activities, Magude district, 1999 Unpublished data).

1.2.2.4 Population and Health

The district has 42,788 inhabitants and 17.3 % are children under the age of 5 years. The predominant language of the district is Changana and the official language is Portuguese.

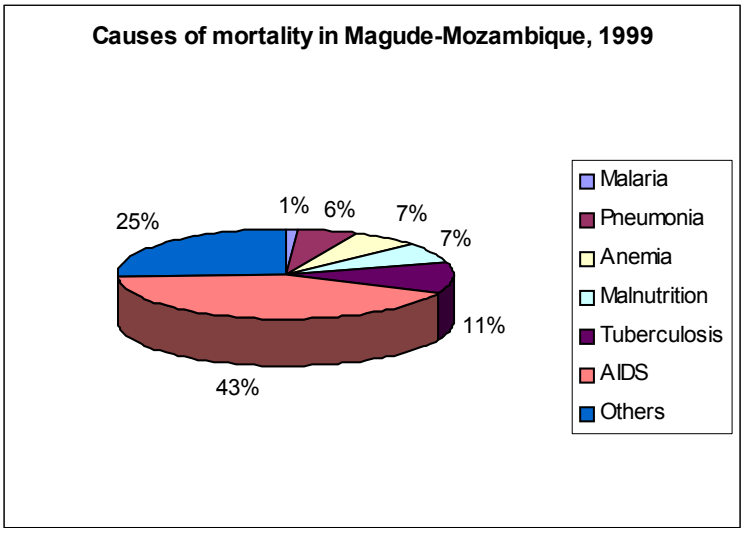
The health services in Magude district are provided through one health center with nursery (HC) in Magude town, 4 basic health centers located in Motaze, Panjane, Chicutzo (PA Mahel) and

Mahel, and 4-health post located in Mapulamnguene and three others in Magude village (Chobela, Mazimuchope and Timanguene). The health services are provided by one general medical doctor, two general medicine technicians, seven basic nurses, six maternal health care nurses, one preventive medicine agent, four elementary nurses, one laboratory worker and one pharmacist (Annual Report of activities, Magude district, 1999 Unpublished data).

All health personal from the general medical doctor, technicians, and laboratory and pharmacy worker to nurses, are involved in the Integrated Management of Childhood Illness (IMCI). With a rotating system all nurses have the opportunity to work with children and in Maternity services in Magude village. A team from Magude health centre covers the outreach program for all Magude and Mapulanguene administrative posts. For the rest of the district the outreach program is provided by health services in the respective administrative posts (Annual Report of activities, Magude district, 1999 Unpublished data).

Figure 2

Diarrhoea was the cause of the 2477 cases received by Magude health centre in 1999. The first cause of mortality in Magude health centre was *AIDS* (42.86%), followed by tuberculosis (11.11%) and malnutrition (7.02%), diseases of poverty, however the figures do not differentiate between children and adults (figure 2).



**Annual Report of activities, Magude, 1999.

In 1991, 1185 were children admitted to the nursery. Also health authorities in Magude in 1999 had described that: AIDS is a big problem, as reported by NGOs in the community, however the health authorities just have received 58 cases (Annual Report of activities, Magude district, 1999 Unpublished data).

Preventive education focuses on Cholera. Issues such as tuberculosis, malaria, malnutrition, sexually transmitted diseases, nutrition, vaccinations, diarrhoeas and mothers health were approached during educational sections (Annual Report of Health activities in Magude, 1999 Unpublished data).

1.2.2.5 War and refugees

During the civil war (1976-1992) this area was devastated and part of the population left the district to seek refuge in urban centres or in South Africa. After the peace agreement, the governments of Mozambique and South Africa began to re-settle these families back in the Magude district, however, 75% of all returnees settled in Magude town (Adamo, 1996).

2. Justification of the study

Lack of the knowledge about persistent diarrhoea in Mozambique was the first reason for carrying out this study.

The relationship between malnutrition and persistent diarrhoea is known but has not been studied in Mozambique. Almost 95% of the admissions in the nursery of Magude health centre were children and malnutrition was the second most common cause of death.

Risk factors related to Persistent diarrhoea have been studied in many countries but not in Mozambique.

To increase the impact of health education in Mozambique's program, that cares for the health of mother and child. Information about knowledge and development of persistent diarrhoea should be used at all levels of the health system.

Methodological differences in the studies already carried out. Some hospital-based studies had a higher risk of re-infection than community studies and differences in study populations exist. Nevertheless, there is some consensus about the risk factors for development of Persistent Diarrhoea in children.

3. Research hypothesis

3.1. Factors mentioned below, contribute to the development of persistent diarrhoea in this population.

- Low nutritional status.
- Health history of the child.
- Use of medication.
- Feeding practices.
- Poor hygiene.
- *Giardia lamblia*

3.2 Population migration is a risk factor for development of persistent diarrhoea.

3.3 Mothers who have knowledge about acute diarrhoea but no knowledge about persistent diarrhoea.

4. Research question

What are the associated factors for the development of persistent diarrhoea in this population?

5. The objective of the study

5.1 Main objective

The investigation aims to explore the factors associated with the development of persistent diarrhoea.

5.2 Specific objectives

- To find out the prevalence of persistent diarrhoea in Magude administrative post.
- To verify whether the associated factors, which have been identified in other African countries, are relevant in Mozambique.
- To find out if population migration is an associated factor for development of persistent diarrhoea.
- To identify child feeding practices.
- Describe mother's knowledge about diarrhoea, in particular persistent diarrhoea.

6. Limitations of the study

AIDS, the new epidemic problem in sub-saharan countries is related with Persistent diarrhoea and constantly growing in Mozambique. It is likely that there will be a negative impact on economy of the country in the future. Lack of personnel as well as material for assessing HIV were the reasons for leaving this issue for the next opportunity. Counselling before and after the laboratory tests required trained personnel. Follow-up of the infected people with treatments for opportunistic diseases must be available before this approach can be used.

Cryptosporidiosis is another common cause of persistent diarrhoea that was not studied. This is an opportunistic infection related with immunodeficiency. It was not possible to carry out the necessary examinations required to study *cryptosporidiosis* due to a lack of suitable personnel and materials.

II. Methods and population

The methodology described below, was used for the survey conducted in Magude district during July and August 2000.

1. Qualitative method

After training of the data collector by the researcher, qualitative data were collected during Focus Group Discussions (FGDs).

Inclusion criteria were; mothers who had lost a child from diarrhoea during the year of the study, mothers who had more than 3 children and mothers who had less than 3 children but had a child with diarrhoea. Four groups of mothers, one in each village except Mapulanguene, with children between 6-23 months old were selected to discuss their knowledge of diarrhoea, especially cause and severity. Mothers with mental disorders according to family declaration were excluded from these discussions.

24 mothers were selected, 6 from each administrative post excluding Mapulanguene. Mothers (grandmothers or other dominant people in society) who were not originally selected, but volunteered information were included in the study. Discussions were taped, with the consent of the participants.

The **FGDs** were guided by the followings opened questions:

1. What has been the cause of your child's diarrhoea during the first 2 years of life?
2. When your child had diarrhoea, what changes did you see in your child's condition?

a. Which changes were the most worrying for you?

3. What medicines did you use to reduce or treat these episodes of diarrhoea?
4. What diet did you use to reduce or treat these episodes of diarrhoea?
5. What other things did you do to reduce or treat these episodes of diarrhoea?

2. Quantitative Methods

Descriptive and analytical study, using "*case-control design*" was carried out using children aged 6 to 23 months in the district as the study population.

2.1 Selection of the cases and controls

The following groups of children were compared in this study: children without diarrhoea, children who have had diarrhoea for more than two weeks and children who have had diarrhoea more than two days but less than two weeks. To find the desirable target group of children, inquires were made to women having children that fulfilled the followings definitions:

- **Cases**: The inclusion criteria for the defined groups are: children between 6-23 months of age, with more than three liquid or semi-liquid stools per day, in a period of two weeks and more. Other important considerations were: only one child in each household with the above inclusion criteria, was included in the study; household was considered to be the occupants of the house regarded as a unit; and excluded children less than 6 months old and mothers who did not give consent to the study.

- **Controls**: In addition a control will include a hundred children without diarrhoea and a hundred with diarrhoea consisting of more than three liquid or semi-liquid stools per day for two days or more but less than two weeks. The controls were matched by age groups (6-8, 9-11, 12-14, 15-17, 18-20 and 21-23 months), sex and neighbourhood.

A hundred children from the target group were classified as cases (PD), 100 children were classified as first control group with (AD) and the last remaining 100 children were identified in the last control group as (WD).

2.2 Sampling procedure : A population list of clusters or ``quarteirao´´ in each administrative post was drawn up. The sampling started from the geographic centre of the cluster. A direction was randomly chosen with a coin. The number of houses (X) lying in that direction up to the boundary was counted. A number between 1 and X was randomly chosen, and then the survey began at the corresponding house. Because of the difficulty of finding controls with acute diarrhoea during the pilot study, every house was selected. Soon after finding an acute diarrhoea case corresponding controls were located.

Table x: Sample size according to population in Magude district

Administrative post	Inhabitants*	(%)	Sample size
Magude	33,247	(75)	75
Motaze	4,641	(9)	9
Mapulanguene	896	(2)	2
Panjane	1,481	(6)	8
Mahele	495	(8)	6
Total	42,760	(100)	100

*Annual report of Magude district, 1999

3. Laboratory techniques

Stools from all participating children were collected in sealed containers and immediately transported to the health centre. Examination was done by traditional microscopy, which required identification of cysts or motile trophozoits in the stool samples. Repeated stool evaluations as described by Thielman (1998) were carried out.

The National Institute of Health of Mozambique trained the researcher, two weeks before the survey and the laboratory agent working in the district health centre was trained during the pilot study.

Quality control was carried out in the National institute for Health in Mozambique by the parasitology department. One laboratory technician specialised in parasitology worked with the researcher during the fieldwork. Also the head of the parasitology department in National Institute of Mozambique went to Magude district to supervise the laboratory diagnoses.

4. Data collector's recruitment

With the help of the health manager of the district four data collectors were found, who were able to speak and write Portuguese and Changana (local language). They consisted of two primary school teachers, one secondary school student and one mother working in the women's organisation of the district (OMM). All were female with experience of work in community who had been participating in population census, mobilisation campaigns on health and population issues.

5. The research instruments

5.1 Questionnaire

In a structured questionnaire, mothers described their behaviour related to feeding, use of drugs and other relevant subjects (see annex 1).

The questionnaire was written in Portuguese and officially translated to Changana (local language) by the Faculty of Languages in the University Eduardo Mondlane. All data collectors carried out inquiries in Portuguese and guideline in Changana.

These variables were included in order to answer the research hypothesis:

•Dependent variable: Persistent Diarrhoea.

•Independent variables: were divided into (a) key variables and (b) universal or confounding variables.

(a) Key variables: diet, nutritional status, hygiene, medication, health history of the child, and migration. (See pag.11)

(b) Universal variables: child age, sex, mothers education, mothers age, mothers profession, fathers profession, number of children and adults in the family, socio-economic status.

5.2 Anthropometrical measurements

Anthropometrical measurements of the children in terms of weight, length and age were recorded.

- Weight (w) was measured by weighing the children wearing only minimum amounts of clothing, and recording to the nearest 100 grams, using a saltier balance (adjusted to point 0).
- Age (A) was found from growth monitoring cards given after birth delivery by normal health services. These are health road card adopted by WHO.
- Height (H) was measured using a wooden measuring board. The child was laid on the board, the head was put firmly against the fixed head board, and the knees were extended with the feet at right angles to the lower leg. The sliding foot piece was moved to obtain firm contact with the heel, and the length read to the nearest 0.1 centimetres.

Nutritional status was expressed according to National Centre for Health Statistics/ World Health Organisation (NCHS/WHO) reference.

5.3 Mobilisation

The central government of the district and administrative post leaders including traditional authorities received general information about the study. After their agreement the schedule of the visit was given to them. The representatives informed the community about the study and the dates of the survey so that the mothers and children targeted for the study were at home on the survey date. Some houses were visited more than once in order to find the mother or caretaker at home. The community authorities involvement was important and an effective way to spread the information. All the people targeted agreed to participate in the study.

5.4 Data collection

Data collection was carried out from 1st of July to 30th of August 2000, daily, (including weekends), from seven o'clock in morning to five o'clock in afternoon.

The researcher was responsible for logistic, planning, training and co-ordination of the project. She applied for research permission, collected data and ensured correct measurement as far as possible in all aspects of data collection. A pilot study was done in Magude village, during which helpers were trained, the questions were revised and the final form of questionnaire was set.

The data collectors received one-weeks training in sampling, interview technique, anthropometrical measurements and stool collection and packaging. The practical part of training was done in the health centre.

Attention was also paid to information about child age and the behaviour of mothers when it comes to malnutrition and feeding practices in the followings ways:

- Researcher or data collector interviewed a mother. Then observed household hygiene characteristics and in case of diarrhoea, the liquids/medicines used.
- Children selected from the target group were measured in weight and length.
- Health Road Card adopted by WHO were used to control the age.

6. Data handling

Data entry was carried out according to the codes and definitions mentioned earlier PD, AD, WD, age groupings, etc.

Statistical computer program SPSS 9.0 version (Statistical package for social sciences) was used for the analysis.

For a general description of the study population frequency distributions were used. Association between categorical variables were explored by odds ratio, 95% confidence interval (CI) and means of the chi-square test with Yates` correction, or Fisher exact test. Differences between the means of continuous variables were analysed using students' t-test. Statistical significance at a probability (p) of <0.05, was assumed.

The socio economic stratification was based on score ranging from 0-12 points. 0-4 points was considered low, 5-8 mediums and 9-12 high socio-economic status.

For the study to be more accurate and reliable the family for socio economic scores were analysed as a continuous variable.

7. Ethic aspects

Permission to perform this study was received from the Commission for expansion and investigation in Mozambique and Health/administrative authorities in Maputo province and Magude district. The Norwegian Ethical Committee approved research clearance.

Health and administrative authorities introduced the researcher and enumerators to the community before the start of the research. The community members were informed about the research and asked for their co-operation by the community authorities.

The human rights principles, ethical guidelines of the Medical Association of Mozambique and medical ethics of department of International Health of the University of Oslo were followed and respected. The participants were guaranteed full confidentiality.

Sanitary and nutritional education had been given in the region studied before the research started, by health workers from the district health services in their routine daily work.

Severely ill children were immediately evacuated or referred to the nearest health centre for proper treatment and management. Every child with diarrhoea, even those not in the target group, was given a reference card to the health facility.

The health authorities in Magude district will be informed of the results of this study.

III. Results

This chapter contains the following sections: qualitative, quantitative in terms of case-control analysis, prevalence of PD and *Giardia lamblia*, and laboratory results.

1. Qualitative

The FGDs revealed that similar knowledge was often held by focus group participants in four of the administrative posts in Magude district. The followings sections summarise the similarities between these mothers in their knowledge on diarrhoea and other related problems.

1.1 Cause of diarrhoea

The mothers from this district said that ``*Diarrhoea is caused by lack of hygiene*''. Different aspects of hygiene were mentioned e.g. unclean food, unprotected or food that is not covered, flies and not washing hands after handling stools or urine.

Almost all participants of FGDs knew the negative consequences of unclean food. They believed that: unclean food is vegetables that were not washed before cooking or food that was not covered and the flies had accesses to it. The link between unwashed fruits and diarrhoea was however weak.

An interesting aspect was that water quality and handling was difficult subject to approach in all FGDs. It was never directly associated with diarrhoea. Use of Chlorine in water during a *Cholera* epidemic was once mentioned. However it was only used when supplied by health authorities.

1.2 Signs and symptoms

In the FGDs, changes of physical status of the children during a diarrhoea episode were often mentioned. The following expression from an young mother illustrates the negative consequences attributable to diarrhoea: ``*When a child gets worse they lose so much weight and become very weak that they would finally die´´*.

Participants in FGDs seriously discussed this issue. The extreme signs and symptoms like: loss of weight, weakness, do not eating, not playing and anaemia were mainly mentioned. Malaria was linked to diarrhoea when headache and fever were present during diarrhoea episode.

Important signs and symptoms like dry skin and mouth, sunken, tearless eyes, sagging in of the `soft spot' in infants, loss of elasticity or stretchiness of the skin, number and consistency of stools were not well recognised by participants in FGDs.

1.3 Medicines and liquids

The ability to prepare on oral rehidratation solution (ORS) was generally known by participants in the FGDs. Consequently ORS was always mentioned as a important liquid/medicine to give a child with diarrhoea. The following quote from a mother illustrates the knowledge and importance given to ORS: `` *…boil one litre of the water and mix with one pack of ORS, and then we give to the child with diarrhoea during 24 hours... ´´*

The following mixture was mentioned as alternative to ORS: water, sugar and salt. She said that for one litre of boiled water she mixes one teaspoon of sugar and another of salt. It showed that even through the quantities were wrong, some idea about use of sugar and salt was known.

Participants in FGDs said that: ``… *If the child does not get better we continue giving ORS together with tablets from health centres´´.* Mothers did not know the names of tablets usually prescribed to the child. Taking the ill child to the health facility was the last solution mentioned by mothers. The participants were reluctant to discuss the use of traditional medicines but mentioned that it is possible to treat *Ascaridiasis* with traditional medicines.

1.4 Diet

In the FGDs, the need to give the child different food, and not the usual diet, were often mentioned. However the participants believed that soups and maize porridge are the best food for a child with diarrhoea. An interesting aspect that emerged was that: ``…the food must be not solid``. The reason for giving semi-liquid food was to make it easier for the child to swallow when they lost their appetite.

Lack of animal proteins in the diet was often mentioned as a important factor with a negative effect on the child. Meat was mentioned as food for special days e.g. ceremonies, Independence Day and New Year. Participants in the FGDs did not widely discuss the relationship between food type and quality.

Mothers who lived in the interior areas of the district mentioned the use of traditional fermented porridge, however mostly the cooked porridge mentioned was not fermented.

1.5 Others

Two issues arose about the duration of diarrhoea episodes and accessibility to health facilities that were considered very important and thus described below.

Accessibility to health facilities was referred as a ``big problem´´. They said they were far away and difficult to reach because transport is expensive and they cannot afford it and there are lions on the routs to the health centres. Therefore they were afraid to walk, especially during the night. Usually they must ask for help from neighbours, who can transport them to the health facilities.

Deaths on the way to the health facilities have been frequent said a mother. Sometimes the child must remain a long time with the disease untreated and if they do not die the disease becomes chronic.

2. Quantitative

This section describes the results from the statistical analysis of the questionnaires and anthropometrical measurements done during the survey in Magude district.

2.1 Age distribution

The age group distribution of the cases and controls is shown in table 1. There are more cases/controls in the youngest age groups.

Table 1: Number of children in each age group

Age in months	Numbers of children
6 to 8,	28
9 to 11	19
12 to 14	24
15 to 17	11
18 to 20	14
21 to 23	4
Total	100

2.2 Case-control analysis of PD according to risk factors

This sub-section describes the results by risk factor. The findings that showed significance ($p<0.05$) can also be followed in the tables 4 and 5, pages 37 and 38 respectively.

2.2.1 Matching by gender and age was done in this study. The sex ratio in the study groups was close to 1:1. Using a t-test it was found that there were no significant ($p>0.05$) age differences between groups in the study. The average age for each target group is shown in table 2.

Table 2: The average age for each target group under study

Group of study	Mean age in months	(S.D.)
PD	12.26	(4.64)
AD	12.20	(4.44)
WD	12.11	(4.68)

2.2.2 Socio economic status of the children in the study groups was low (score between 0-4) to medium (score between 5-8) as described below.

- PD group with the mean of 5.62.
- AD group with mean of 5.21.
- WD group with the mean of 4.82.

Comparing PD and control groups used the t-test to test the levels of significance, but only the PD and WD group comparison were significant. ($p=0.034$)

2.2.3 Household characteristics studied were the followings: number of children in the family, fathers' employment status, mother's age, mothers employment status and mothers level of education. The above-cited characteristics did not show significance during the survey.

2.2.4 Migration history of the mother was analysed based on the total of mothers who had been living in South Africa plus mothers who had been living in different parts of Mozambique. Comparisons of the 11 mothers in the PD group who had a temporary migration history to 15 in AD group was not significant as was the comparison to 20 in the WD group ($p=0.05$).

The table below shows accurately about the migration history of the mothers.

Table 3: Migrated and not migrated mothers

	Migration		No	
Group of children	South Africa	Mozambique	Migration	Total
PD	6	5	89	100
AD	5	10	85	100
WD	7	13	80	100
Total	18	28	254	300

2.2.5 Hygiene, water and sanitation. There was no significant difference between the numbers of children who had acute or persistent diarrhoea in families, which used protected drinking water. This result was the same for treated drinking water**.**

There were significant differences between the numbers of children who had PD compared to those WD, in families who had used both protected water ($p=0.04$) or treated water ($p=0.003$). Out off 295 mothers who were observed, only 207 (70%) washed their hands after using the toilet (latrine) or changing babies nappies (or washing nappies). Comparison of those who did not wash their hands in the PD group, to those in the AD group was not significant as well as the comparisons to the WD group.

Fifty families with approximately the same number in each group did not have latrine at home.

2.2.6 Health history of the children shows that out of 300 children, 270 (90%) who suffered from any type of disease in the 2 months prior to the survey. Within this group there was a significant difference ($p<0.0001$) between children having PD and those with AD but not between those with PD and those with WD.

From the 270 children who had been ill at same time during the 2 months prior the survey, 204 (75.5%) had diarrhoea, 58 (21.5%) had Malaria, 5 (1.9%) had a cough and 3 (1.1%) had other diseases.

Comparison of the children who had a diarrhoea history in PD group, to those who had a diarrhoea history in the AD group was significant ($p<0.0001$).

The proportion of children who had Malaria, coughs and other diseases, was almost in same between study groups.

2.2.7 Use of liquids. There were significantly (p=0.046) more children in WD group compared to the PD group whose mothers gave liquids when the child had diarrhoea. The majority (62.3%) of the mothers used Oral Rehidratation Solution (ORS) and (9.3%) used rice water alone when the child had diarrhoea.

Out of all the children who received ORS there were significantly (p<0.0001) more in WD group than in the PD group and there were no significant differences between the PD and AD groups.

From the children who had been give rice water when they had diarrhoea there were significantly (p=0.014) more in the PD group than in the WD group.

2.2.8 Medicines(traditional and/or conventional) were given to the children during diarrhoea episode. From the range of children given medicines, of any kind, there were significantly (p=0.004) more in the WD group than in the PD group, and no significant difference between the PD and the AD group.

2.2.9 Two types of milk were assessed with the following findings: 295/300 (98.3%) mothers gave breast milk to the children. 98 in the PD and AD groups, and 99 in the WD group of children. Out of those who gave breast milk 12.2% had given animal milk in addition and only 1.7% mothers had given animal milk alone, to their children. These figures were very similar in each of the study groups.

2.2.10 O*ther type of food*. Out of those children who were given non-root vegetables there were significantly (p=0.04) more in the AD group than in the PD group, and significantly (p=0.018) fewer in the WD group than in the PD group. Comparations of the 97/100 children in PD group whose were not eating roots (cassava, sweet potatoes) to 88/100 in AD group significant difference was found (p=0.029), opposite to the comparations to 94/100 in group WD. Cereals were almost gave to all children. Leguminous were mostly ate than fish, meat or eggs.

Table 4: Factors associated with Persistent diarrhoea after comparisons with AD group.

Variable		PD (Nº)	AD (Nº)	O.D. (95% C.I.)	P value *(X²)*
Any kind of disease in the last 2 months prior to study	Yes	**98**	**78**	1	<0.0001
	No	2	22	3.82 (3.15; 60.58)	
Diarrhoea in the last 2 months prior to study	Yes	**77**	**48**	1	<0.0001
	No	23	52	3.63 (1.97; 6.67)	
Child had root vegetables in the diet?	Yes	3	11	0.25 (0.07; 0.92)	0.029
	No	**97**	**88**	1	
Child had non root vegetable in the diet	Yes	43	57	0.56 (0.32; 0.97)	0.04
	No	**57**	**42**	1	

OR= odds ratio; 95%CI= 95% confidence interval; PD= Persistent diarrhoea; AD= Acute diarrhoea

Table 5: Factors associated with PD when it was compared with WD group.

Variable		PD (Nº)	WD(Nº)	O.D. (95% C.I.)	P value (X^2)
Temporary migration	Yes	11	20	0.46(0.21-1.0)	0.05
	No	**89**	**78**	1	
Use of protected drinking water	Yes	**96**	**87**	1	0.04
	No	4	13	3.59(1.13-11.41)	
Use of treated drinking water	Yes	**60**	**39**	1	0.003
	No	40	61	2.34(1.33-4.14)	
Child had taken more liquids during diarrhoea episode	Yes	84	93	0.39 (0.15-10)	0.046
	No	**16**	**7**	1	
Child had taken O.R.S. during diarrhoea episode	Yes	46	83	0.17 (0.09-0.33)	<0.0001
	No	**54**	**17**	1	
Child had taken rice water during diarrhoea episode	Yes	**15**	**4**	1	0.014
	No	85	96	4.23 (1.35-13.25)	
Use of medicines	Yes	82	95	0.24(0.09-0.67)	0.004
	No	**18**	**5**	1	
Child had non-roots vegetable in the diet	Yes	43	27	2.04(1.13-3.69)	0.018
	No	**57**	**73**	1	

OR= odds ratio; 95%CI= 95% confidence interval; PD= Persistent diarrhoea; WD=Without diarrhoea
PS. In bold the important values for the analysis.

2.3 Case-control analysis of PD according to Nutritional status

Comparison of the mean HA z score (-2.30) for the PD group with those of the AD (-1.61) and WD (-1.71) groups was significant in both cases, $p<0.001$ and $p=0.016$ respectively. The mean

WA z score for the PD group (-1.36) was also significantly different to those of the AD (-0.63) and WD groups (-0.13) with p values 0.004 and <0.001 respectively. The mean WH z score for the PD (0.39) was only significantly (p<0.001) different from the WD group score (1.49) and not from the AD group score.

The described results are specified in table 6.

Table 6: Nutrition Status of children and comparisons of the study groups

Z score		PD	AD	WD	PD x AD **t-test**	PD x WD **t-test**
Haz	**Mean**	-2.30	-1.61	-1.71	<0.0001	0.016
	S.D.	1.65	1.74	1.79		
Waz	**Mean**	-1.36	-0.63	-0.13	0.004	<0.001
	S.D.	0.97	1.38	1.24		
Whz	**Mean**	0.38	0.59	1.49	>0.05	<0.001
	S.D.	1.81	1.65	2.05		

haz= height-age z score; waz= weight-age z score; whz= height-weight z score; PD= Persistent diarrhoea; AD= Acute diarrhoea; WD=Without diarrhoea

2.4 Prevalence of Persistent diarrhoea

From 1997 census data it was observed that children aged 6 to 23 months make up 5.3% of the population in Mozambique. From 33,247 inhabitants of Magude administrative post, 1762 were children aged 6 to 23 months. 82 cases of persistent diarrhoea were found, so the prevalence of the study disease is 4.65% (82/1762) in Magude administrative post.

2.5 *Giardia lamblia*

From 300 stool samples collected, only 16 tested positive for *Giardia lamblia.* 5.3% of children in this study were affected by the parasite.

There were 6 in the group PD, 5 in the AD group and 5 in the WD group. Tests showed no significant difference in the occurrence of *Giardia lamblia* between the PD group and either of the control groups. ($p>0.05$)

IV. Discussion and Conclusion

In general the risk factors for development of persistent diarrhoea that have been described in studies done in other African countries were also the case in Magude-Mozambique.

1. Associated risk factors

In Magude district poor nutritional status and poor diet are the principal factors associated with persistent diarrhoea.

1.1 Poor nutritional status is positively associated with persistent diarrhoea. Poor nutritional status is widely recognised as one of the major risk factors for persistent diarrhoea and has been reported from a number of studies as described by Sodeind (1997). In addition, Rice (2000) described that persistent diarrhoea can aggravate the poor nutritional status.

Sodeind (1997) found that children with persistent diarrhoea had worse nutritional indices than those who had acute diarrhoea. Agreeing with the above cited author, this study shows that the nutritional indices (height for age, weight for age and weight for height) were the lowest among children with persistent diarrhoea than others groups of children (Acute diarrhoea and Without diarrhoea).

The results of this study show that in a population already at risk of being stunted, (Ministry of Health of Mozambique, 1997), persistent diarrhoea can aggravate malnutrition of the children. The children with persistent diarrhoea are stunted and underweight, and appear more chronically than acutely undernourished. Sodeind (1997), in a Nigerian study compared those who developed persistent diarrhoea with those who did not develop persistent diarrhoea, in a group of children suffering from acute diarrhoea and found that children suffering from persistent diarrhoea tended to be more wasted than stunted. It is possible that the risk of developing acute malnutrition already existed among Sodeinds study population.

AIDS, the new epidemic problem in Sub-Saharan countries, is related with Persistent diarrhoea and is constantly growing in Mozambique, but it was not assessed, and became a limitation of the present study (UNICEF, 2000). It is known that *AIDS* brings poor healing capacity of the intestinal epithelium and impaired immunity with inability of the body to eliminate the causative organisms of diarrhoea. Therefore, it can also aggravate the nutritional status of the children with PD.

Low socio-economic status of the families can result in long term reduced food intake and it can be hypothesised as a reason for the association between low nutritional status and persistent diarrhoea in the study group. A surprising finding in this study was that: a small but significant difference in the socio economic status, between persistent diarrhoea group and without diarrhoea group was found ($p<0,034$). It is interesting to note that most of the children without diarrhoea were from a lower socio economic status, however the data collection technique did not include ownership of cattle and agricultural production by the family, which is the traditional wealth of this population, as concluded by Adamo (1996). The population sample and the parameters used to describe socio-economic status can explain the small differences of the socio-economic scores found in this study. The sample includes 75% of children from Magude Administrative post (most populated area and centre of Magude district). The people here have brick-built houses, piped water and electricity, which were the most highly scored parameters contributing to socio-economic status. This gave people from the township a higher score on socio-economic status, however living conditions seemed to be worse than in the most highly populated central area of Magude than in the countryside.

A study by Oni (1996) on socio economic conditions and diarrhoeal diseases, found a high number of diarrhoeal cases in a population from low socio economic status in a rural area of Nigeria. The Ministry of Health in Mozambique also identified that poor households are less likely to have adequate sanitation facilities, which may lead to diarrhoea and malnutrition. However, Bytzer et all (2001), did not find any association between diarrhoea and socio economic status.

1.2 Diet. Consumption of vegetables was negatively associated with persistent diarrhoea. Possible explanations are: a) the necessity to give better quality food to the children with severe diarrhoea, which was mentioned by mothers during focus group discussions. b) The majority of children in all study groups do not eat vegetables. It is almost impossible to grow vegetables in Magude Township and the families do not have the means to buy them from a market (National Institute of Statistics of Mozambique, 1997). c) Preventive health education on nutrition, given by health workers, tend to be directed towards acute diarrhoea rather than chronically diseases such as persistent diarrhoea, which was revealed in focus group discussions.

According to the FGDs, children with severe diarrhoea consumed better quality of food. From the qualitative study it was found that a poor quality diet, especially in terms of proteins. It is possible to conclude that the advice about the necessity of giving complementary protein, complex carbohydrates and fats during the persistent diarrhoea episode was not found in this survey. This finding agrees with the findings of Bhan (1996) and Karim (2001).

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1.3 Migration was negatively associated with persistent diarrhoea. This association can be explained by the report from the Centre of Disease Control (CDC, 1992), which described that: safe places, during the war, were crowded. The WHO through the local governments directed their resources towards refugee camps and big cities. Where the war was taking place, there was a lack of all social services and health care. People who had migrated tended to live where the health services were provided or at least could be reached and this helped the mothers to improve their knowledge about treating diarrhoea.

It could also be the case that those who had migrated had a higher standard of living, had better jobs, better places to live and were generally better educated in matters of health, (Adamo, 1996).

1.4 Water, drinking treated and protected water was both positively associated with persistent diarrhoea. Possible hypotheses for this finding can be: a) this study did not look into possible ways of contamination. These ways are linked to the methods of collecting, transporting, storing and treating water (Norwegian Church Aid, 1996). b) People were too trusting of piped water. But poor water quality, not appropriate for human consumption, was found to be the case by the district health services (1999). And the establishment of new water services (transport and treatment) was taking place, during this survey. These explain the consequent outbreaks of diarrhoea.

1.5 Use of medicines (conventional/biomedical or traditional) including *ORS* show negative association with persistent diarrhoea. There are several likely reasons: Firstly, there was damage to some intestinal mucosa resulting from the use of drugs, especially antibiotics. Drugs have been used to treat very ill children, which was a point raised by mothers during focus group discussion. This finding seems to contradict the Green and Sodeman (1999) description about use of drugs during diarrhoea episodes.

Secondly, there is a lack of knowledge about persistent diarrhoea, a disease that leads to serious consequences after a long sickness. This lack of knowledge is the likely reason that the mothers do not give medicines to the child.

The last reason is the difficulty of getting a prescription, because the mother is unable to travel to health services, when the child is ill.

The negative association of *ORS* with persistent diarrhoea can be explained by the use of ORS to hydrate children with acute diarrhoea, which was mentioned during focus group discussions. Is known that a child with persistent diarrhoea does not have the basic need of rehydration as described in DDOnline (1992). The conclusion is that the use of ORS has been well directed.

The use of *rice water* was positively associated with persistent diarrhoea. This is a traditional treatment, which is used carefully by mothers when they become worried about their childs health. Rehydration solution and carbon hydrate supplements, found in rice water, are not expensive, however it still little used among mothers with ill children.

1.6 Health history of the child. In agreement with other studies there was a positive association with persistent diarrhoea. The first hypothesised reason could be the lack of adequate treatment for the acute cases of disease. For example a mother can give ORS to a child with acute diarrhoea and it becomes better but the child would not be treated for the basic disease. The diarrhoea can become persistent as described in previous studies done by Sodeind (1997) and Oyejide (1991).

Secondly, the lack of knowledge about chronic diseases was apparent during focus group discussions, which is another possible reason for the association. Preventive health education

given by the local health provider is directed to the acute diseases while chronic PD can progress without treatment (Magude district, 1999).

The last hypothesis for the above association can be the reduced immunity and reduced nutritional status resulting from a previous disease, for example *AIDS*. This can be the basis for the development of a chronic disease.

2. Knowledge about diarrhoea

Better knowledge about diarrhoea, than that described by Cuttis (1988), Zoysa (1984), and Sodemman (1996) was found. People knew that diarrhoea could appear because of lack of hygiene and not because of natural causes (teething, etc). They had a good knowledge of signs and symptoms related to acute diarrhoea, however, they still lacked knowledge about other types of diarrhoea. ORS was well prepared and regularly given to the children with diarrhoea, it seemed to be more properly used than was described by Cuttis in 1988. The use of medicines on very ill children is a good procedure, however the dosage of medicine was not assessed. Preventive health education about acute diarrhoea by health providers appears to have been successful.

3. The magnitude of persistent diarrhoea in the Magude administrative post

In this study, the prevalence of persistent diarrhoea was 4,65%. This figure is lower than was described by Ketema and Mbouri-Ngacha (1997). The present figure agrees with Sodeinds (1995) statement about low frequencies of persistent diarrhoea in community studies. A probable reason for the present finding can be the study setting. Hospitals have a higher risk of re-infection than in the community. It seems that the higher the re-infection risk is, the higher the risk of getting persistent diarrhoea.

This study was carried out in the centre of Magude district where an important health facility and a medical doctor are located. There appears to be good access to the health facility. Acute cases of disease could be immediately treated, as well as insidious diseases and persistent cases, which could be diagnosed and treated more promptly.

If the preventive health education, has been more effective in Magude than in the settings of the previous studies, then this can explain the low prevalence of diarrhoea described here.

Another reason could be the methodology used in the present study. An active search of persistent diarrhoea cases was carried out in Magude administrative post. The population, cited by Health authorities of Magude (1999), was used as a denominator.

4. *Giardia lamblia*

Giardia lamblia showed 5,3% (16/300) prevalence among the target group of children. This finding is higher than the 3,1% prevalence from the study in Saudi Arabia by el-Sheikh (2001). The figures for the prevalence of *Giardia lamblia* are from a group of children that start to crawl and walk, therefore they are children exposed to a high risk of contamination compared to the group of children under five used in the Saudi Arabia study.

Metronidazol is a drug used to treat *Giardia lamblia*. This is one of the few antibiotics included in the kits of medicines distributed monthly to the health facilities. Probably the frequent use of this drug is reducing the number of people who are carriers of this parasite. The use of this antibiotic could be reducing the infection cycle, which reduces the infection load in the community.

Another reason for the for the relatively low prevalence of *Giardia lamblia* can be that there were only 3 stool examinations for each child. Aspiration of the duodenal liquids and biopsy were not carried out.

Presence of *Giardia lamblia* did not show any association with persistent diarrhoea in the present study, as well as in the previous studies (Bardhan, 1997).

V. Recommendations

- The mother of a child who has a prolonged episode of disease should be counselled about ways of avoiding malnutrition as well as preventing persistent diarrhoea.

- To start early as possible to educate the community about persistent diarrhoea.

- It is suggested that there should be a focus on nutrition and chronic diseases in health education programs.

- To teach the mothers the correct way to make alternative liquids, focus on rice water.

- Future research must assess the methods of collecting, transporting, storing and treating water.

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Questionnaire for identification of factors associated with the development of persistent diarrhoea in children aged 6-23 months in Magude-Mozambique

Confidential interview schedule for clients

Status of the clients

1 case

2 control

Date of interview----/----/----.

Questionnaire situation

Complete-----

Incomplete-----

Reasons if is incomplete----------

Study serial no:

PARTICIPATION PERMISSION

Dear mother:

The department of international health in Oslo University and Eduardo Mondlane University are carrying out a household survey among children age 6-23 months randomly selected in Magude district.

This survey has the objective to find out ways to help mothers with ill child.

The questionnaire will be treated with confidence so feel free to answer all questions as honest as possible.

The questions will cover information on social demographic data as well as behaviour and health history toward persistent diarrhoea.

Your participation is optional, and the interviewer signature at the end of this sheet means that you accept the interview.

Your co-operation is greatly appreciated; thank you very much for participation in our study.

Interview signature:

Researcher:

Isabel I. Keshavji

MPhil in International Community Health 1999-2001.

Oslo University.

Questionnaire for identification of factors associated with the development of persistent diarrhoea in children aged 6-23 months in Magude-Mozambique

2000

Instructions: where applicable either circles the correct answer or insert the number that describes each response in the corresponding box provided. Do not write in the boxes under the column labeled official.

SECTION 1

Social demographic data

1. *Identification and family characteristics*

Name of household head:----------

Address:----------

Child name:----------

Child age:---------months.

Child sex: male ❒

female ❒

a. How many children do you have?

1-2 ❒

≥3 ❒

b. How many adults do you have at home?

1-2 ❒

≥3 ❒

c. How many years the mother has?

<19 ❒

≥19 ❒

d. What level of formal education have you (mother) completed?

Low (primary school) ❒

No education ❒

e. What is the present occupation of the mother?

Peasant farmer ❒

Other (specify) ❒

f. What is the occupation of the father?

Peasant farmer ❒

Miner ❒

Other (specify) ❒

2. Migration history of the family

a. How long the family is living in Magude?

Native ❒

No native ❒

b. Does the family leave temporary the district?

Yes ❒

No ❒

c. If yes, where you move?

Within Mozambique ❒

Outside the country ❒

c.1. Where----------

3. *Household characteristics (observation)*

a. Type of house

Cabin ❒

Straw and stick ❒

Masonry ❒

Mud and timber ❒

b. Type of water consumption

Piped water supply ❒

Well water in own yard ❒

Public well ❒

Borehole ❒

Cistern (rain water) ❒

Water from river ❒

c. Electrical power supply

Yes ❒

No ❒

d. Presence of latrine or toilet

Yes ❒

No ❒

SECTION 2

Hygiene and sanitation (observation)

a. Kind of water storage

Covered ❒

Not covered ❒

b. Treatment of water (boiled, chemicals, other)

Yes ❒

No ❒

d. Wash hands after using toilet or changing the child nappies.

Yes ❒

No ❒

SECTION 3

Health history and status

a. Has the child been ill during the two last months, prior to this visit?

Yes ❒

No ❒

a.1. If yes, what disease the child had?

Diarrhoea ❒

Malaria ❒

Coughs ❒

Other ❒

b. Has your child diarrhoea now?

Yes ❒

No ❒

c. If yes, how long he has diarrhoea?

<2 weeks ❒

≥2 weeks ❒

d. When the child has diarrhoea are you giving liquids to child?

Yes ❒

No ❒

e. If yes, what kind of liquids? (Observation in case of diarrhoea)

Oral rehydration solution ❒

Rice water ❒

Other ❒

f. Are you giving medicines to child during diarrhoea episode?

Yes ❒

No ❒

SECTION 4

Diet

a. What kind of milk are you giving to your child?

Breast milk ❒

Animal milk ❒

b. Are you giving other kind of food?

Yes ❒

No ❒

b.1. If yes, what type of food?

Cereal ❒

Nuts (cashew nuts, peanuts, etc.) ❒

Meat ❒

Fish ❒

Eggs ❒

Non-roots vegetables (Leaves= cabbage, cassava, etc.) ❒

Roots vegetables (potatoes, yam, cassava, etc.) ❒

Other ❒

SECTION 5

Anthropometrical measurements

Kind of measure	Measurements
Weight (kg)	
Length (cm)	

SECTION 6

Laboratory exams

Date of sample collection----/----/----.

Results: 1 exam ----------.

2 exam ----------.

3 exam ----------.

Thank you very much .